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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/066,920	02/04/2002	Takenori Sekijima	P/1071-1539	4354

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04/29/2003

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EXAMINER

SONG, MATTHEW J

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 04/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/066,920

Applicant(s)

SEKIJIMA ET AL.

Examiner

Matthew J Song

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) 5-7 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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DETAILED ACTION

Election/Restrictions

1. Claims 5-7 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 8.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Kou (US 5,114,528).

Kou discloses a method of forming a monocrystalline body from a polycrystalline feed rod by floating zone refining such that a molten zone is caused to traverse the polycrystalline rod to convert the polycrystalline rod to a monocrystalline body (claim 1). Kou also discloses the formation of NaNO_3 crystal rods using polycrystalline NaNO_3 feed rods 6 mm in diameter, prepared by casting and a shaper provided with holes for melt flow of 1 and 2 mm in diameter, this reads on applicant's fiber shaped crystal, which is 3 mm or smaller in diameter. Kou also discloses the density of feed rod is expected to significantly different from that of the crystal (col 9, ln 10-68). Kou also discloses no single crystal seeds were required to grow single crystals of

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NaNO₃ (col 10, ln 19-22). Kou also discloses a heater is formed of a RF induction coil (col 7, lm 30-40).

Kou is silent to the crystal grows in the direction normal to the densest surface. However, this is inherent to Kou because Kou teach a similar method of float zone growth. Also the molten zone is inherently less dense than a growing single crystal therefore the growth inherently occurs in a direction normal the growing single crystal, the densest surface.

Referring to claim 2, Kou discloses NaNO₃, this reads on applicant's oxide single crystal.

Referring to claim 3, Kou discloses the Floating Zone method, note column 3, lines 60-68.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kou (US 5,114,528) as applied to claims 1-3 above, and further in view of Cordova-Plaza et al (US 5,082,349) or Kobayashi et al (US 4,323,418).

Kou discloses all of the limitations of claim 4, as discussed previously, except that step (b) is performed using the Laser Heated Pedestal Growth Method.

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In a method of manufacturing single crystals, Cordova-Plaza et al teaches single crystal fibers have been manufactured using the laser heated pedestal growth method, a variant of the float zone process. And in such a method, the upper end of a source rod of crystal material is heated with a focused laser beam (col 2, ln 1-67). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Kou with Cordova-Plaza et al's laser heated pedestal growth method utilizing a laser beam to form a molten zone because heating with a laser beam to form a molten zone is well known variant to the float zone method of crystal growth.

In a method of growing single crystals, note entire reference, Kobayashi et al teaches a floating zone technique, where a feed rod is heated into a molten zone by radio frequency heating or laser heating, this reads on applicant's laser heated pedestal growth method, and the molten zone is transferred, thereby turning the feed rod into a single crystal (col 1, ln 10-55). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Kou's RF heating with Kobayashi's laser heating because substitution of known equivalents for the same purpose is held to be obvious (MPEP 2144.06).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kawakami et al (US 5,650,007) teaches producing a single crystal filament by the laser heat floating zone method and this method is developed by scaling down the floating zone for growth of extremely thin single crystals from extremely thin raw material rods (col 1, ln 25-40).

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Chen et al (US 6,074,087) teaches a floating zone method and a Laser heated pedestal growth apparatus composed of CO₂ laser beam source (col 5, ln 1-67).

Fujimura et al (US 2001/0007239) teaches a crystal growth method for gradually solidifying a melt in a vertical direction from the surface of a melt without a seed crystal, note entire reference.

Yoshida et al (US 4,853,066) teaches a method of growing a single crystal without locating a seed crystal at the start of crystal growth (claims 1 and 5-6).

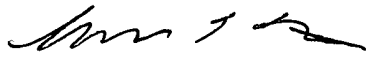
7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J Song whose telephone number is 703-305-4953. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin L Utech can be reached on 703-308-3868. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Matthew J Song
Examiner
Art Unit 1765

MJS
April 27, 2003


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SUPERVISORY PATENT EXAMINER
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